CLAIMS

1. A method of creating an electrically active pattern, the method comprising the steps of:

a. providing a colloidal suspension of nanoparticles, the nanoparticles exhibiting a desired electrical characteristic and being surrounded by an insulative shell;

b. applying the suspension to a substrate, the applied suspension being substantially insulative owing to the nanoparticle shells; and

c. exposing the applied suspension to energy in a desired pattern, the energy removing the shells from the nanoparticles and fusing the nanoparticles together, thereby causing exposed portions of the applied suspension to exhibit the electrical characteristic.

2. The method of claim 1 further comprising the step of drying areas of the applied suspension that have not received energy, the dried areas remaining insulative.

3. The method of claim 1 wherein the suspension is applied to the substrate as a film.

4. The method of claim 3 wherein the applied suspension is spin-coated to produce a uniform film.

5. The method of claim 3 further comprising the step of applying a second suspension of nanoparticles over the film and exposing the applied second suspension to energy in a desired pattern, the energy removing the shells from the nanoparticles of the second suspension and fusing them together without damaging the underlying film.

6. The method of claim 5 wherein the nanoparticles of the second suspension have an electrical characteristic different from the nanoparticles of the underlying film.

7. The method of claim 5 further comprising repeating the application and exposing steps to form a plurality of additional contiguous layers.

8. The method of claim 1 wherein the suspension is applied to the substrate in a pattern by displacement.

9. The method of claim 8 wherein the displacement is performed so as to apply the suspension to the substrate in a substantially planar pattern.

10. The method of claim 9 further comprising the steps of again performing the displacement so as to apply a second suspension onto the previously applied pattern and exposing the applied second suspension to energy in a desired pattern, the energy removing the shells from the nanoparticles of the second suspension and fusing them together without affecting the underlying pattern.

11. The method of claim 8 wherein the displacement is performed so as to produce a first layer with projecting features; a second layer over the first layer, the first-layer projections penetrating the second layer; and a third layer over the second layer in contact with the first-layer projections.

12. The method of claim 8 wherein the displacement is performed so as to produce a first layer; a second layer over the first layer, the second layer having gaps therein; and a third layer over the second layer in contact with the first layer through the second-layer gaps.

13. The method of claim 8 wherein the displacement is performed with a plurality of suspensions different materials to form a patterned layer thereof on the substrate.

14. The method of claim 1 wherein the shells have a surface charge and the substrate has a complementary charge in a pattern thereover, the applying step comprising spreading the particles over the substrate and removing particles not immobilized by the substrate charge.

15. The method of claim 14 wherein the applying and removing steps produce a new layer, and further comprising the step of applying a surface charge to the new layer and repeating the applying, exposing, and removing steps with a new colloidal suspension of nanoparticles.

16. The method of claim 1 wherein the nanoparticles are conductive.

17. The method of claim 1 wherein the nanoparticles are semiconductive.

18. The method of claim 1 wherein the energy is in the form of electromagnetic radiation.

19. The method of claim 18 wherein the energy is provided by a laser.

20. The method of claim 18 wherein the energy is provided by exposing the applied suspension to a radiation source through a patterned photomask.

21. The method of claim 1 wherein the energy is thermal.

22. The method of claim 1 wherein the nanoparticles consist of a chemical compound, the particles having a melting point lower than that of the compound in bulk.